Status of atmospheric environment and research efforts in Korea

STATUS OF ATMOSPHERIC ENVIRONMENT AND RESEARCH EFFORTS IN KOREA

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Abstract

1. Environment Policy for Air Quality in Korea

The Korean policy for the atmospheric environment has been initiated with the establishment of Anti-pollution Act in 1977 which was replaced by the Atmospheric Environment Preservation Act (1990) based on the Fundamental Regulation for Environmental Policy. Until now, a wide range of changes have been made while modifying and revising the act. As the result of such national efforts, the concentration of underdeveloped-type pollution species such as atmospheric SO2 has decreased steadily since the late 1990's. The concentration of ozone and PM10 pollution mainly in the Seoul metropolitan area, however, has been hardly improved despite the various emission regulations and the reinforcement of air quality standard.

The tantalizing problem of the air quality improvement in Korea is caused by the congestion of metropolitan population. While the administrative district area of the five major cities occupies 2.5% of the country area, the residence of these cities occupies 45% of the total national population. And 25% of the national population of Korea resides in Seoul, which takes up only 0.6% of the country area. Generally in such circumstances with the high density of residence, the air pollution in the urban areas is worse compared to rural areas, which is frequently reported in many studies. This kind of living environment with the high density of residence leads also the high degree of health risk induced from air pollution...

Historically the air pollution in Korea has been degraded by the heavy chemical industry and the urbanization of the 1970's and has been accelerated by the chemical use in high-end industry and automobile consumption in the 1980's. The aspect of air pollution has also been quickly shifting to pollution phases caused by fast-growing industry such as smog, ozone, particle matter, and noxious substance generation. The frequency of ozone warnings in the metropolitan areas and the number of residential complain cases are increasing, while the public recognition on pollution is getting more delicate.

To cope with these confronted tasks, Korea has specified areas with the high pollution rates as Special Atmospheric Preservation Measure Areas and Atmospheric Environment Regulation Areas, while reinforcing stronger emission standards compared to general standards. The government has given effort in this problem by specifying Seoul and the metropolitan area as the Seoul Metropolitan Environment Regulation Area, and also by establishing the Special Act on Seoul Metropolitan Air Quality Improvement in 2003.

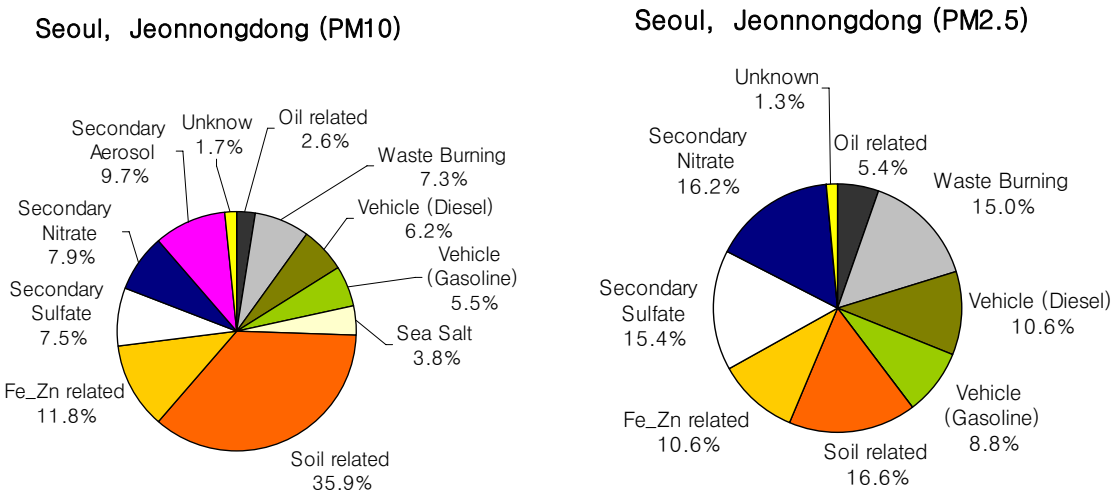
2. Statistics of Air Quality in Seoul

In Seoul, the NO_2 concentration has repeatedly increased and decreased since the 1990's. PM10 has decreased after the first measurement in 1995 until 1999 when it started to increase again. The concentration is currently showing a fairly constant level. Ozone concentration has increased since 1994, and Pb levels have been constantly decreasing since 1991, recording 30% drop from 1991's level in 2003. Recently the primary air

pollutant such as TSP and SO_2 are decreasing in Seoul area, but a sharp increase in fuel consumption and traffic has produced the secondary pollution problems such as visibility impairment and ozone episodes...

Upon the persistent efforts on the air quality improvement, SO_2, CO, and Pb have been improving. However, PM10, O_3, and NO_2 are getting slightly worse since 2000. Especially management policies such as the emission source management have been set according to TSP, despite that the Atmospheric Environment Standards on PM10 has been set in 1995. Subsequently the policies hardly produce the outstanding effect on lowering PM10 which is composed of small-sized particle and more harmful to human-beings. Based on the understanding, researches on the mechanism of particle matter generation and on reduction measure establishment are currently conducted to improve the air quality of Seoul and its surrounding metropolitan area in the long run.

In the study, the PM10 and PM2.5 were collected in Jeonnong-dong, Seoul (2002~2005) to analyze 26 chemical compounds such as Carbon substances and Ion substances. Receptor modeling technique was also applied for a quantitative analysis on the contribution of pollution sources affecting the particle matter pollution of metropolitan areas. The emission contribution according to site and particle diameter by PMF is shown below in Figure 1. The major contribution of PM10 in Jeonnong-dong was in the order of soil-related sources (35.9%), secondary particles including sulfates and nitrates (25.1%), and automobile discharges (11.7%). The PM2.5 contribution was in the order of secondary particles (31.6%), automobile discharges (19.4%), soil-related sources (16.6%), biomass burning (15.0%).



<Figure 1> Average source contribution for PM10 and PM2.5(%)

3. Conclusion

The East Asian countries including Korea, Japan, and China have been performing proper policy programs to improve and maintain their national air quality but they are in lack of information on the macro-scaled air quality issue by means of long-range transport unfortunately. Although each country equips with the required budget and researchers, the collaboration among neighboring countries is still insufficient. Due to this, the lack of the environmental data is occurred, which in turn becomes the huddle to propose the fundamental solution of the macro-scale air quality in the Eastern Asia. In order to obtain the most effective and const-efficient policy measures in air quality management, the collaboration among excellent researchers in this region is strongly suggested.